AMENDMENTS TO THE CLAIMS

Claim 1 (Currently Amended): A turbo decoder having a state metric, comprising:

branch metric calculation means for calculating a branch metric by receiving symbols through an input buffer;

state metric calculation means for calculating a reverse state metric by using the calculated branch metric at said branch metric calculating means, storing the reverse state metric in a memory, calculating a forward state metric; and

log likelihood ratio calculation means for calculating a log likelihood ratio by receiving the forward state metric from said state metric calculation means and reading the reverse state metric saved at a memory in said state metric calculation means~~.~~,

wherein the log likelihood ratio L_k is calculated by using an equation

$\mathring{A}_{m=0}^{2^{-?}1,P}(A_k^{1,m}+B_k^{s(m)})-\mathring{A}_{m=0}^{2^{-?}1,P}(A_k^{0,m}+B_k^{m})$ wherein m is a state of a trellis diagram; k is a stage; $s(m)$ is a function a number complemented a Most Significant Bit(MSB)of binary number of m; $\mathring{A}_{j=0}^{,P}$ is a function defined as $E_{j=0}^{1} A_k^j = A_k^0 \; E \; A_k^1 = \log_e(e^{A_k^0} + e^{A_k^1})$; j is a $(k\text{-}1)^{th}$ input for a reverse state metric; $A_k^{1,m}$ is a k^{th} forward state metric with state m and input 1; $B_k^{s(m)}$ is a k^{th} reverse state metric with state $s(m)$; $A_k^{0,m}$ is a k^{th} forward state metric with state m and input 0 and B_k^{m} is a k^{th} reverse state metric with state m.

Claim 2 (Currently Amended): The turbo decoder in recited as claim 1, wherein said state metric calculation means includes:

reverse state metric calculation means for calculating a reverse state metric in case an input i is 0 according to states of the branch metric; and

forward state metric calculation means for calculating a forward state metric in case an input i is 0 ~~and~~ or in case the input i is 1 according to states of the branch metric.

Claim 3 (Currently Amended): A calculation method implemented to ~~the~~ a turbo decoder, comprising steps of:

a) calculating a branch metric by receiving symbols;

b) calculating a reverse state metric in case an input i is 0 by using the calculated branch metric and saving the calculated reverse state metric in a memory;

c) calculating a forward state metric in case an input i is 0 ~~and~~ or in case the input i is 1 by using the calculated branch metric;

d) calculating a log likelihood ratio by using the forward state metric and the reverse state metric; and

e) storing the log likelihood ratio~~.~~,

wherein the log likelihood ratio L_k is calculated by using an equation

$$\overset{2^{-?}|,P}{\underset{m=0}{\mathring{A}}}(A_k^{1,m}+B_k^{s(m)}) - \overset{2^{-?}|,P}{\underset{m=0}{\mathring{A}}}(A_k^{0,m}+B_k^{m})$$

wherein m is a state of a trellis diagram; $s(m)$ is a function provides a number complemented a Most Significant Bit(MSB)of binary number of m; $\overset{,P}{\underset{j=0}{\mathring{A}}}$ is a function defined as $\overset{1}{\underset{j=0}{E}} A_k^j = A_k^0 \, E \, A_k^1 = \log_e(e^{A_k^0} \pm e^{A_k^1})$;$j$ is a $(k\text{-}1)^{th}$ input for a reverse state metric; k is a stage; $A_k^{1,m}$ is a k^{th} forward state metric with state m and input 1; $B_k^{s(m)}$ is a k^{th} reverse state metric with state $s(m)$; $A_k^{0,m}$ is a k^{th} forward state metric with state m and input 0 and B_k^{m} is a k^{th} reverse state metric with state m.

Claim 4 (Currently Amended): The calculation method as recited in claim 3, wherein the reverse state metric B_k^m, which is k^{th} reverse state metric with state *m*, is calculated by using an equation $\overset{P}{\underset{j=0}{\mathring{A}}}(B_{k+1}^{F(j,m)} + D_{k+1}^{j,f(m)})$, wherein *m* is a state of a trellis diagram; *k* is a stage; *j* is a $(k\text{-}1)^{th}$ input for a reverse state metric; *f(m)* is the state of $(k+1)^{th}$ stage related to *the state m of* k^{th} stage ~~*f(m)* is $(k+1)^{th}$ state related to k^{th} state with state *m*~~ ; *F(j,m)* is a function defined as *F(j,m)=f(m)* for *j=0* and *F(j,m) = s(f(m))* for *j=1*; *s(m)* is a function provides a number complemented for a Most Significant Bit(MSB) of binary number of m ~~binary number of m with a most significant bit complemented~~; $\overset{P}{\underset{j=0}{\mathring{A}}}$ is a function defined as $\overset{1}{\underset{j=0}{E}} A_k^j = A_k^0 \, E \, A_k^1 = \log_e(e^{A_k^0} + \underline{e^{A_k^1}}\ \text{-}\cancel{e^{A_k^0}})$; $B_{k+1}^{F(j,m)}$ is a $(k+1)^{th}$ reverse state metric with state *F(j,m)* and $D_{k+1}^{j,f(m)}$ is *(k+1)th* branch metric with state *m* and $(k+1)^{th}$ input.

Claim 5 (Currently Amended): The calculation method as recited in claim 3, wherein the forward state metric A_k^m, which is k^{th} forward state metric with state *m*, is calculated by using an equation $\overset{P}{\underset{j=0}{\mathring{A}}}(D_k^{j,b(j,m)} + A_{k-1}^{b(j,m)})$ wherein *m* is a state of a trellis diagram; *k* is a stage; *b(j,m)* is the reverse state of the $(k\text{-}1)^{th}$ stage ~~a $(k\text{-}1)^{th}$ reverse state~~; *j* is a $(k+1)^{th}$ input for a reverse state metric; $\overset{P}{\underset{j=0}{\mathring{A}}}$ is a function defined as $\overset{1}{\underset{j=0}{E}} A_k^j = A_k^0 \, E \, A_k^1 = \log_e(e^{A_k^0} + \underline{e^{A_k^1}}\ \text{-}\cancel{e^{A_k^0}})$; $A_{k-1}^{b(j,m)}$ is a $(k\text{-}1)^{th}$ forward state metric with state *b(j,m)*and $D_k^{j,b(j,m)}$ is k^{th} branch metric with state *b(j,m)*.

Claim 6 (Canceled)

Claim 7 (Currently Amended): The calculation method as recited in claim 3, wherein the reverse state metric B_k^m, which is k^{th} reverse state metric with state m, is calculated by using an equation $\overset{,P}{\underset{j=0}{2}}(B_{k+1}^{F(j,m)} + D_{k+1}^{j,f(m)})$, wherein m is a state of a trellis diagram; k is a stage; j is a $(k\text{-}1)^{th}$ input for a reverse state metric; $f(m)$ is a state of $(k+1)^{th}$ stage ~~$(k+1)^{th}$ state~~ related to k^{th} state with state m; $F(j,m)$ is a function defined as $F(j,m)=f(m)$ for $j=0$ and $F(j,m) = s(f(m))$ for $j=1$; $s(m)$ is a function provides a number complemented for a Most Significant Bit(MSB) of binary number of m ~~binary number of m with a most significant bit complemented~~; $\overset{,P}{\underset{j=0}{2}}$ is a function defined as $\overset{,P}{\underset{j=0}{2}} A_k^j = A_k^0 \, 2 \, A_k^1 = log_2(2^{A_k^0} + \underline{e^{A_k^1}} \_ \cancel{e^{A_k^0}})$; $B_{k+1}^{F(j,m)}$ is a $(k+1)^{th}$ reverse state metric with state $F(j,m)$ and $D_{k+1}^{j,f(m)}$ is $(k+1)th$ branch metric with state m and $(k+1)^{th}$ input.

Claim 8 (Currently Amended): The calculation method as recited in claim 3, wherein the forward state metric A_k^m, which is k^{th} forward state metric with state m, is calculated by using an equation $\overset{,P}{\underset{j=0}{2}}(D_k^{j,b(j,m)} + A_{k-1}^{b(j,m)})$ wherein m is a state of a trellis diagram; k is a stage; $b(j,m)$ is a $(k\text{-}1)^{th}$ reverse state; j is a $(k+1)^{th}$ input for a reverse state metric; $\overset{,P}{\underset{j=0}{2}}$ is a function defined as $\overset{,P}{\underset{j=0}{2}} A_k^j = A_k^0 \, 2 \, A_k^1 = log_2(2^{A_k^0} + \underline{2^{A_k^1}} \_ \, 2^{A_k^0})$; $A_{k-1}^{b(j,m)}$ is a $(k\text{-}1)^{th}$ forward state metric with state $b(j,m)$and $D_k^{j,b(j,m)}$ is k^{th} branch metric with state $b(j,m)$.

Claim 9 (Currently Amended): The calculation method as recited in claim 3, wherein the log likelihood ratio L_k is calculated by using an equation $\sum_{m=0}^{2^{?|,P}} (A_k^{1,m} + B_k^{s(m)})$ - $\sum_{m=0}^{2^{?|,P}} (A_k^{0,m} + B_k^{m})$ wherein m is a state of a trellis diagram; k is a stage; ~~j is a $(k-1)^{th}$ input for a reverse state metric;~~ $s(m)$ is a function provides a number complemented for a Most Significant Bit(MSB) of binary number of m ~~binary number of m with a most significant bit complemented~~; $\sum_{j=0}^{,P}$ is a function defined as $\sum_{j=0}^{,P} A_k^j = A_k^0 \sum A_k^1 = log_2(2^{A_k^0} + 2^{A_k^1}$ ~~$2^{A_k^0}$~~); $A_k^{1,m}$ is a k^{th} forward state metric with state m and input 1; j is a $(k-1)^{th}$ input for a reverse state metric; $B_k^{s(m)}$ is a k^{th} reverse state metric with state $s(m)$; $A_k^{0,m}$ is a k^{th} forward state metric with state m and input 0 and B_k^m is a k^{th} reverse state metric with state m.

Claim 10 (Currently Amended): A computer-readable recording medium storing instructions for executing a calculation method implemented to ~~the~~a turbo decoder, comprising functions of:

calculating a branch metric by receiving symbols;

calculating a reverse state metric in case an input i is 0 by using the calculated branch metric and saving the calculated reverse state metric in a memory;

calculating a forward state metric in case an input i is 0 ~~and~~ or in case the input i is 1 by using the calculated branch metric;

calculating a log likelihood ratio by using the forward state metric and the reverse state metric; and

storing the log likelihood ratio~~.~~,

wherein the log likelihood ratio L_k is calculated by using an equation

$\sum_{m=0}^{2^{-?|,P}} \mathring{A} (A_k^{1,m} + B_k^{s(m)}) - \sum_{m=0}^{2^{-?|,P}} \mathring{A} (A_k^{0,m} + B_k^{m})$ wherein m is a state of a trellis diagram; k is a stage; j is a $(k\text{-}1)^{th}$ input for a reverse state metric; $s(m)$ is a function provides binary number of m with a most significant bit complemented; $\overset{,P}{\underset{j=0}{\mathring{A}}}$ is a function defined as

$\underset{j=0}{\overset{1}{E}} A_k^j = A_k^0 \, E \, A_k^1 = log_e(e^{A_k^0} + e^{A_k^1})$; $A_k^{1,m}$ is a k^{th} forward state metric with state m and input 1; $B_k^{s(m)}$ is a k^{th} reverse state metric with state $s(m)$; $A_k^{0,m}$ is a k^{th} forward state metric with state m and input 0 and B_k^m is a k^{th} reverse state metric with state m.

Claim 11 (New): The computer-readable recording medium as recited in claim 10, wherein the log likelihood ratio L_k is calculated by using an equation

$\underset{m=0}{\overset{2^{-?|,P}}{2}} (A_k^{1,m} + B_k^{s(m)}) - \underset{m=0}{\overset{2^{-?|,P}}{2}} (A_k^{0,m} + B_k^{m})$ wherein m is a state of a trellis diagram; k is a stage; j is a $(k\text{-}1)^{th}$ input for a reverse state metric; $s(m)$ is a function provides binary number of m with a most significant bit complemented; $\underset{j=0}{\overset{,P}{2}}$ is a function defined as

$\underset{j=0}{\overset{,P}{2}} A_k^j = A_k^0 \, 2 \, A_k^1 = log_2(2^{A_k^0} + 2^{A_k^1})$; $A_k^{1,m}$ is a k^{th} forward state metric with state m and input 1; $B_k^{s(m)}$ is a k^{th} reverse state metric with state $s(m)$; $A_k^{0,m}$ is a k^{th} forward state metric with state m and input 0 and B_k^m is a k^{th} reverse state metric with state m.

Claim 12 (New): The turbo decoder having a state metric as recited in claim 1, wherein the log likelihood ratio L_k is calculated by using an equation $\underset{m=0}{\overset{2^{-?|,P}}{2}} (A_k^{1,m} + B_k^{s(m)})$ - $\underset{m=0}{\overset{2^{-?|,P}}{2}} (A_k^{0,m} + B_k^{m})$ wherein *m* is a state of a trellis diagram; *k* is a stage; *j* is a *(k-1)*th input for a reverse state metric; *s(m)* is a function provides binary number of m with a most significant bit complemented; $\underset{j=0}{\overset{,P}{2}}$ is a function defined as $\underset{j=0}{\overset{,P}{2}} A_k^j = A_k^0 \; 2 \; A_k^1 = log_2(2^{A_k^0} + 2^{A_k^1})$; $A_k^{1,m}$ is a k^{th} forward state metric with state *m* and input *1;* $B_k^{s(m)}$ is a k^{th} reverse state metric with state *s(m);* $A_k^{0,m}$ is a k^{th} forward state metric with state *m* and input *0* and B_k^{m} is a k^{th} reverse state metric with state *m.*